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THE FERN-COLLECTOR'S GVIDE

by
WILLARD N. CLVTE

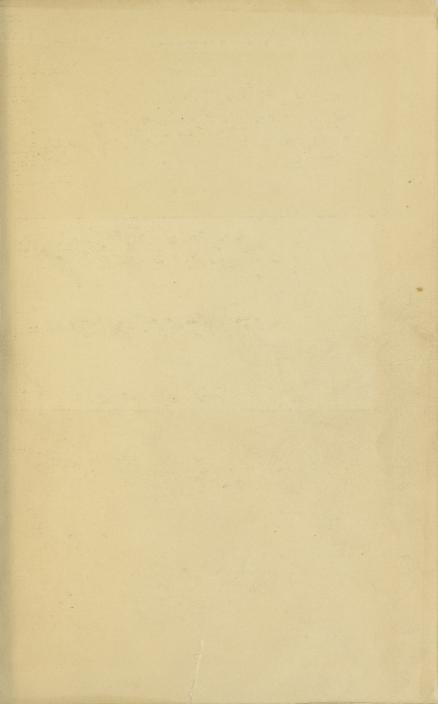
Illustrated by WILLIAM W. STILSON

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COMMON CHAIN FERN. Woodwardia Virginica.

THE FERN-COLLECTOR'S GUIDE

Tabere to find and bow to Hame the Ferns

BY WILLARD NELSON CLUTE

Author of "A Flora of the Upper Susquehanna," "Our Ferns in Their Haunts," etc.



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U.S. DEPARTMENT

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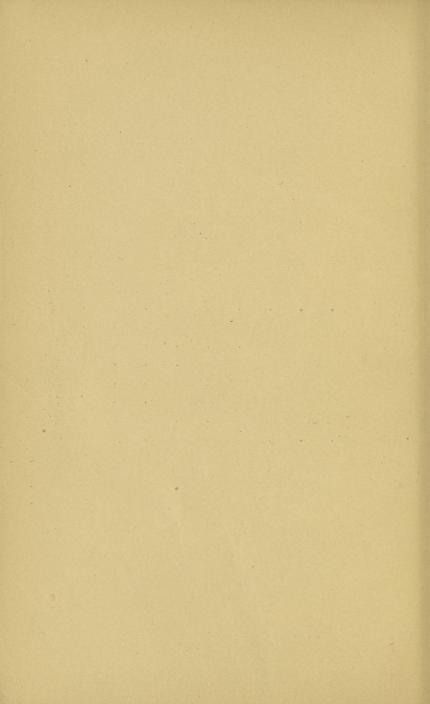
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CONTENTS.

			PAGE.
Preface			5
How to Distinguish the Ferns .			7
WHERE TO FIND FERNS	٠.		12
COLLECTING AND PRESERVING .			24
IDENTIFICATION AND NOMENCLATUR	E.		32
ILLUSTRATED KEY TO THE GENERA			35
CHECK-LIST OF THE FERNS			44
GLOSSARY			57



PREFACE.

Since the publication of "Our Ferns in Their Haunts" I have been repeatedly urged to reprint the illustrated key to the genera of ferns in that volume in a form convenient for carrying into the haunts of the ferns themselves. In acceding to this request, it has seemed desirable to include with the key certain additional matter which does not appear in the larger volume, but which should be of considerable assistance to the novice bent upon finding and naming the ferns.

It not infrequently happens that, notwithstanding the general abundance of ferns in most localities, the collector has some difficulty in finding all the species in a given area. Many kinds make such nice distinctions in the matter of habitat that directions where to find them seem quite necessary. It is believed that with the directions in this booklet, the fern collector will have no trouble in learning the name of any species he may find, or in finding all the species in his locality. Should he desire to know more about his specimens, or should he have doubts of the correctness of his identifications, he is referred to "Our Ferns in Their Haunts," where every known fact in the life histories of our ferns is detailed and illustrations of each species given.

In the chapter on Collecting and Preserving, instructions have been given which will enable the student to preserve his specimens in the best form for future reference, if desired. So far as I am aware, this information has never been included in a work on ferns.

The illustrations in this booklet are from "Our Ferns in Their Haunts," and the check-list of species and Glossary are from the same work. The check-list has been printed upon only one side of the page in order that notes regarding each species may be entered there.

Should the student find specimens that he has trouble in placing, I shall be glad to name them for him if good herbarium specimens are sent me, accompanied by a selfaddressed stamped envelope for reply.

WILLARD N. CLUTE.

Binghamton, N. Y.
May 10, 1902.

HOW TO DISTINGUISH THE FERNS.

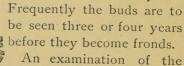
N the vegetable world, the families of plants differ from one another as much as do the beasts, birds, fishes, and insects of the animal kingdom. The most highly developed plants bear flowers and seeds, while less specialized types, such as the mosses, liverworts, and seaweeds, exist and reproduce their kind without either seeds or flowers. The

ferns stand midway between these extremes. On the one hand their method of reproduction shows a relationship to the mosses; while on the other, the structure of the plant body links them to such more highly developed but still primitive families of flowering plants as

the grasses, pines, palms, and sedges.

The ordinary fern plant consists of roots, rootstock (or trunk), and leaves. The rootstock corresponds to the stem of other plants and is usually to be found on the surface of the soil or buried some inches beneath it. From the underside it gives off numerous roots, and from the growing end it sends up the handsome leaves which we commonly call fronds. By the manner in which

the rootstocks progress through the soil, and the way in which they give off the fronds, ferns may be divided into two classes. In the one, of which the bracken is a good representative, the rootstock is slender and creeps extensively, giving off fronds at intervals; in the other, the rootstock is thick, lengthens very slowly, and all the fronds are borne in a circular crown at the growing end. The cinnamon fern is a good example of the second class. Within the circle of growing fronds are many buds, becoming successively smaller toward the centre. These are destined to form the fronds of other years.



An examination of the bud of any true fern will show it to be coiled from tip to base like a watch-spring, instead of being folded as are the leaves of flowering plants. Not only is the leaf as a whole coiled in this manner, but each of the divisions, even the smallest, is rolled up in a similar way. It is therefore not easy to mistake a fern for a flowering plant if we can examine its buds.

There are about four thousand species of ferns in the world, but not one bears

flowers or seeds. Their method of reproduction, how-

Crosiers.

ever, is fully as complicated and remarkable as in the flowering plants. The process may be briefly described as follows: About the time that the leaves of most species are full grown, there will appear upon the back or under surface of some of them, certain small, round or oblong dots, which a simple lens shows to be collections of tiny globes, each globe on a separate stalk. Within these globes are produced many minute one-celled bodies

called spores. These, though too small to be seen without strong magnification, are each capable of ultimately producing a new fern under favourable conditions. Spores differ from seeds in that they are incapable of directly giving rise to a plant like the parent. When we plant a seed, we expect a plant like the one on which it grew to come up; but when a fern spore germi-

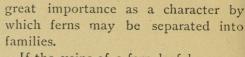


Sori of Polypodium.

nates, instead of a fern, there first appears a tiny, flat, green scale less than a quarter of an inch across, bearing two sets of organs upon its under surface. Not until the contents of these two sets of organs have united, is a new fern produced. This green scale is called the prothallium. It may be found by searching dark and moist spots in the haunts of the ferns.

The tiny globes that contain the spores grow in very regular clusters called sori (singular, sorus). In most species each cluster is covered until the spores are ripe by a thin colourless membrane called an indusium. This is of many curious patterns—kidney-shaped, round, star-shaped, cuplike, etc., and in addition to helping distinguish the ferns from all other plants, the shape is of

Sori of Asptenium.



If the veins of a fern leaf be examined, they will be found to fork instead of forming an irregular network of large and small veins as in the leaves of other plants. So characteristic is this form of venation in the ferns, that one can usually say very positively

when shown a small portion of a leaf, whether it is from a fern or not. Occasionally the tips of the veins are united, forming quite regular meshes, but these are seldom confused with a similar network in other leaves.

From the fact that the fronds of many species are finely divided, it is often assumed that any plant with dissected foliage must of necessity be a fern. This, however, is an error. In the Tropics, where ferns are most abundant, there are many species with entire

leaves, while there are hosts of flowering plants with dissected leaves that are not closely related to the ferns.

The ferns of the northeastern States are similar in appearance to the majority of species throughout the world; but some, even here, are so far from



Venation.

the general conception of a fern, as to be easily mistaken for something else. In warmer countries there are many more. The tree ferns are palm-like in appearance, with tall thorny trunks and spreading crowns of foliage. Some of the filmy ferns are very likely to be confused with certain mosses and liverworts, being so small that entire plants can be covered with a dime. The climb-

ing ferns resemble flowering vines and ascend to the tops of small trees, while among the low-growing, earth-loving species, there are fronds that are grasslike, star-shaped, or triangular. In all cases, however, they must conform to the primary characteristics of a fern. When one finds a plant that has a woody trunk or rootstock, fork-veined leaves coiled in the bud, and producing spores instead of seeds, no matter what its outward appearance, he may be sure he has found a fern.

WHERE TO FIND FERNS.



LTHOUGH three-fourths of the ferns are found in tropical regions, the rest are so widely scattered that few parts of the globe are without one or more species. Limited areas, even in the North, are often very rich in ferns. In New York thirty-four species have been reported growing wild,

within a circle whose diameter is less than three miles. In suiting themselves to so many different habitats, ferns have shown a remarkable adaptability. They are found from sea level to the mountain tops; from the equator to well within the Arctic Circle. They grow on earth, rocks, trees, and upon other ferns; in woods, fields, marshes, and standing water.

Our ferns are all earth or rock-loving species of medium size, the largest fronds seldom reaching a length of more than six feet. The natural habitat of each species is fairly well defined, so that it is possible before entering a piece of ground to predict with considerable certainty what ferns will be found there.

In open swamps one of the first species to greet the rambler is the cinnamon fern (Osmunda cinnamomea), whose brown, club-shaped, fertile fronds in the centre of a circle of sterile ones make the plant very noticeable in

early spring. The royal fern (Osmunda regalis) often grows with it, and may be known by its smooth green fronds, with leaflets like the leaves of the locust tree. It fruits at the ends of the fronds, in clusters of green or finally brown spore-cases. If there is much water in the swamp, one may find the common chain fern (Woodwardia Virginica) which especially delights in soft, oozy mud. This species is partial to the vicinity of the seacoast, but is not uncommon in deep boggy spots further inland. It is much like the cinnamon fern in general appearance, except that the fronds come up singly instead of in circular crowns, and the fruit is on the underside of ordinary fronds. Near the sea-coast, also, one may find in shady places the narrow-leaved chain fern (Woodwardia angustifolia). It has two kinds of fronds, the fertile much the taller and narrower with chain-like rows of oblong fruit-dots on the underside.

One may say without much fear of contradiction that the sensitive fern (Onoclea sensibilis) grows in every swamp. Of all our ferns it seems to least deserve to be called sensitive, for its fronds are coarse and thick, and not at all sensitive to ordinary stimuli. The fruit comes late in the year, and consists of a spike bearing short branches, on which appear what look like round green berries, but which are in reality parts of the contracted frond enclosing the spore-cases. These fertile fronds remain above the snow all winter, and serve to identify the plant at that season. None of our other species have fronds resembling it. Almost as common is the marsh fern (Aspidium Thelypteris). It is a slender species with long stipes and nearly twice pinnate blades. It fruits about midsummer, on the underside of the fronds.

These are our principal water-loving species. One

other, the ostrich fern (Struthiopteris Germanica), should be put in the same list, but it is not usually found in swamps. It prefers the borders of streams or the shores of rivers and lakes. While occasionally found in swamps, it is much likelier to be met with in a sandy spot near running water. It has a decided resemblance to the cinnamon fern, but its fruit is a short, stiff pinnate green spike that does not appear until late in the year. Along streams and on the shady borders of swamps, but usually only near the coast, the rare climbing fern (Lygodium



Lygodium with fruit.

palmatum) is likely to occur. It is our only climbing species, and the twining fronds with palmate leaflets cannot be mistaken. The fronds are evergreen and may be sought with success in winter. Along streams, too, if there be shade, is likely to grow the interrupted fern (Osmunda Claytoniana), the one species in our flora having the odd trick of bearing

three or more pairs of brown fertile pinnæ in the middle of the green frond. When fruiting, this trait at once identifies it.

Most of our ferns love warmth and moisture, but the swamp species are among the few that seem to court the open sunlight. This is probably not so much because they delight in the sun's rays, as because they are the only species that can continue life in the swamps after the sheltering trees are removed. The same species may also be found in the wet woodlands, but the woodland fern-flora is usually composed of different species. The narrow-leaved chain fern may be expected if the

soil is soft and springy, and with it there is a chance of finding Aspidium simulatum. This species was but recently discovered and is very little known, probably because of its close resemblance to the marsh fern. A reference to "Our Ferns in Their Haunts" will quickly identify it. In the damp woods, the wood-ferns, as the relatives of Aspidium simulatum are called, are usually plentiful. One of the most interesting is the crested fern (Aspidium cristatum) which has two sorts of fronds; the sterile, short and nearly flat on the earth, the fertile, longer and nearly erect, with pinnæ set upon the rachis like slats in a half-opened blind. Like all the Aspidiums, it fruits on the underside of the fronds. The sori are round and the indusium nearly heart-shaped. Very simi-



Fruiting Pinna of Aspidium simulatum.

lar to the crested fern is Aspidium Boottii, which is to be distinguished by its broader and nearly twice pinnate fronds. There is also less difference in the habit of fertile and sterile fronds. A reference to a larger book will be necessary to identify it with certainty. The spinulose shield ferns (Aspidium spinulosum and A. s. intermedium) are usually plentiful. The variety intermedium is considered to be the most abundant wood-fern in eastern America. Goldie's fern (Aspidium Goldieanum) is probably the handsomest species, but it is not very common. Its fronds might possibly be mistaken for those of the cinnamon fern. They grow in circular crowns, but the fruit is on the underside. Most of the grape ferns

are lovers of moist woods, especially the matricary grape fern (Botrychium matricariæfolium) and the lance-leaved

grape fern (Botrychium lanceolatum.) The two are usually found growing in company, but are nevertheless not easily discovered on account of their small size. They should be looked for among the dead leaves in beech and maple woods. In the same places one may come upon the still smaller Botrychium matricariæfolium tenebrosum or the little grape fern (Botrychium simplex). The narrow-leaved spleenwort (Asplenium angustifolium) and the silvery spleenwort (Athyrium thelypteroides) delight in boggy spots in deep shade. The first is apparently not a very common species. It has very thin, simply pinnate fronds, and may be easily distinguished by the fertile fronds which are much taller and narrower. The silvery spleenwort is more abun-

Botrychium matricariæfolium tenebrosum. dant. It may be readily identified by
the rows of close-set, silvery-white, linear fruit-dots on
the underside.

Where the swamp merges into drier ground the common grape fern (Botrychium obliquum) and its relative the rattlesnake fern (Botrychium Virginianum) may appear. Both have nearly triangular fronds. The fruit of Virginianum is borne on a short stalk from the middle of the frond, early in the season. That of obliquum is on a separate stalk and does not appear until September. They are therefore not easily confused. The oak fern

(Phegopteris Dryopteris) grows in similar places. It, too, has a triangular frond, but it is very thin and yellow-green in colour, and consists of three stalked divisions "like three ferns in one." The fruit is on the underside of the frond and collected in very small, non-indusiate sori. Here, too, should be found the maidenhair (Adiantum pedatum) too well known to need description. The black, shining stipe, with its two curving branches at top and the fan-shaped pinnules, distinguish it at once.

Few species of ferns take kindly to very dry soil, but the dryish woodlands are not without certain peculiar forms. Several of these may be found where the soil contains a great deal of moisture, but in general they are to be looked for in less watery places. The New York fern (Aspidium Noveboracense) is common in dry shades where it forms dense tangles of its medium-sized, yellowgreen fronds. These are readily distinguished from fronds of other ferns by the fact that the pinnæ taper downward until those at the base are mere green ears. The Christmas fern (Polystichum acrostichoides) loves to nestle among the spreading roots of some great tree, but it is by no means confined to dry woods. It is a most abundant species, with thick, leathery fronds that last through the winter and are often used in floral decorations. In fruiting fronds, the upper third of each is abruptly narrowed and bears the spore-cases on the under surface. None of our other ferns have fronds contracted in this manner. Where the ground is rocky, the marginal shield fern (Aspidium marginale) is almost sure to be found. Its most prominent feature is found in the gray, button-like sori, situated close to the margin of the pinnules. This is also an evergreen fern. The broad beech fern (Phegopteris hexagonoptera) is partial to dry woods of chestnut, maple and oak. It has a thin triangular frond, with the two lower pinnæ larger and standing forward. In similar situations the lady fern (Athyrium



Pinnule of Lady fern.

filix-famina) should be found. This is a common fern in many situations, wet or dry, and seldom long escapes the collector. When the fronds are young, they

may easily be identified by the indusia which curve in horse-shoe shape. Later they straighten out and become almost linear, as in the Aspleniums. Dry rocky woods are prime favourites with the ebony spleenwort (Asplenium ebeneum) another of our ferns that makes a distinction between fertile and sterile fronds. In the present case. the narrow fertile ones are almost erect, while the sterile are flat on the earth. The great, stiff, triangular fronds of the bracken (Pteris aquilina) are seldom absent from any kind of woods except the very wet ones and are equally abundant in thickets, pastures, and fence rows. The boulder fern (Dicksonia pilosiuscula), like the bracken, is not confined to dry woods. It seems to care little for shade, provided the ground is rocky. The fronds are soft, delicately cut, and yield a pleasant fragrance when bruised. The odour is almost sufficient to identify it, but the fruit-dots are very characteristic. Under a lens they look like tiny green bowls heaped with spore-cases. In uncultivated fields or meadows where the soil is not too dry, one may chance upon the adder's-tongue (Ophioglossum vulgatum). The plant is not easy to find, but when found, the slender spike of fruit, raised above the simple elliptical or ovate leaf, is enough to identify it.

In regions where shady cliffs are common, the fern

flora is usually much richer than elsewhere. Among the first of the species peculiar to such places, is sure to be noticed the common polypody (Polypodium vulgare) which delights to grow on the tops and upper ledges of dry cliffs. It may be known at once by its thick, dark fronds, most of which bear large round sori on the under surface. The only other species that compete with the polypody for such a habitat, are the rusty woodsia

(Woodsia Ilvensis) and the lip fern (Cheilanthes vestita.) Both love to grow on desolate rocky heights, unprotected from sun and storm. In appearance there are few points by which the novice can distinguish the one from the other. The lip fern, however, is very rare north of New Jersey. The Woodsia is



A bracken Pinnule.

more chaffy, and when the fronds die, the stipes separate half an inch from the rootstock, leaving the bases as a sort of stubble attached to it. The winter brake (Pellea atropurpurea) loves a niche in the face of a cliff, from which to put out its blue-green fronds on their purplish brown stipes. It fruits nearly as the bracken does, in a line on the margin of the pinnules.

On shady ledges numerous small species, mostly spleenworts, find a congenial home. The most abundant is the maidenhair spleenwort (Asplenium Trichomanes) with short narrow fronds radiating in all directions and

forming green rosettes. The fruit-dots, as in all the Aspleniums, are linear. On limestone there is a good chance of finding the small triangular fronds and fanshaped pinnules of the wall rue (Asplenium ruta-muraria).



More rarely the mountain spleenwort (Asplenium montanum) with longer fronds, but otherwise closely resembling the wall rue, will be found, Asplenium Bradleyi is still rarer; in fact, several of the Aspleniums in-

cluding Asplenium pinnatifidum and Asplenium ebenoides, are among the rarest ferns of eastern America. Asplenium ebenoides is supposed to be a hybrid between the ebony spleenwort and the walking fern, and should be looked for on mossy rocks in deep shade where these two species grow. Woodsia obtusa grows luxuriantly in rocky shades. whether on the face of a cliff or on the talus at its base. The lens shows its fruit-dots to possess indusia that are fixed beneath them and spread out in star-shape. The walking fern (Camptosorus rhizophyllus) will most likely be found on mossy ledges of limestone, where the interlacing fronds form dense little mats. Although the fronds are often a foot long, the tapering tips leave so little for the eye to rest upon, that they are easy to overlook, but when once found the rooting tips of the fronds make the identity certain.

One should search for the common bladder fern (Cystopteris fragilis) and the bulb-bearing bladder fern (Cystopteris bulbifera) in ravines where there are moist and dripping rocks. The common bladder fern often selects much drier locations, but the other stays close to the moist cliffs, from which its long, tapering, finely-cut fronds hang in dense tangles. Cystopteris fragilis is

much like Woodsia obtusa in general appearance, though usually much more abundant. The indusium, however, is sufficient to distinguish between them. In Cystopteris this is hood-shaped and attached to the frond by the lower side. It should be noted that the indusium in both Cystopteris and Woodsia withers early and can only be seen to advantage in young specimens. The little slender cliff-brake (Pellea gracilis) is rarely found, save on moist shady ledges of limestone. It has two forms of fronds, the fertile, narrower and more erect, with a broad, marginal indusium. The common beech fern (Phegopteris polypodioides) is less retiring and prefers the base of wet rocks, or any moist ledge in sun or shade from which to send up its triangular fronds. These may be distinguished from the nearly allied Phegopteris hexagonoptera, by being smaller, narrower, and more or less hairy.

There is a great difference in the fruiting time of the ferns, and one will have to pay more than one visit to any good locality before exhausting it of its species. The cinnamon fern fruits as its fronds unfurl; the narrow-leaved chain fern not until past midsummer. Among the early ferns are the royal fern, interrupted fern, rattle-snake fern, common bladder fern and the Christmas fern. The late ones include the common grape fern, climbing fern, curly grass, sensitive fern, and ostrich fern. Several of these may be found in good fruit when the leaves are falling in autumn. Most of the wood ferns and spleenworts fruit about midsummer.

In the following list of species, catalogued according to the habitats they prefer, only such species have been included as are of general distribution. Species like the curly grass (*Schizæa pusilla*) of the New Jersey barrens, the green spleenwort (*Asplenium viride*) of the Vermont

mountains, and the Killarney fern (*Trichomanes radicans*) a southern species reaching to Kentucky, have been omitted as not likely to be found by the beginner. Species of wider distribution than the others will be found in more than one list.

SPECIES OF SWAMPS AND ALONG STREAMS.

Osmunda cinnamomea Osmunda regalis Osmunda Claytoniana Aspidium Thelypteris Onoclea sensibilis Woodwardia angustifolia Woodwardia Virginica Lygodium palmatum Struthiopteris Germanica

SPECIES OF WET WOODLANDS.

Adiantum pedatum
Aspidium Boottii
Aspidium cristatum
Aspidium Goldieanum
Aspidium marginale
Aspidium simulatum
Aspidium spinulosum
Aspidium Thelypteris
Aspidium Noveboracense
Athyrium thelypteroides
Athyrium filix-fæmina
Asplenium angustifolium

Botrychium obliquum
Botrychium matricariæfolium
Botrychium lanceolatum
Botrychium simplex
Botrychium Virginianum
Lygodium palmatum
Osmunda cinnamomea
Osmunda Claytoniana
Osmunda regalis
Polystichum acrostichoides
Woodwardia angustifolia
Phegopteris dryopteris

SPECIES OF DRYISH WOODS.

Adiantum pedatum
Aspidium marginale
Aspidium Noveboracense
Asplenium ebeneum
Athyrium filix-fæmina
Dicksonia pilosiuscula

Ophioglossum vulgatum Phegopteris hexagonoptera Phegopteris dryopteris Polystichum acrostichoides Pteris aquilina

SPECIES OF FIELDS, PASTURES AND ROADSIDES.

Asplenium ebeneum Athyrium filix-fæmina Botrychium obliquum Dicksonia pilosiuscula Ophioglossum vulgatum Pteris aquilina

SPECIES OF DRYISH CLIFFS.

Asplenium Bradleyi
Asplenium ebeneum
Asplenium ebenoides
Asplenium montanum
Asplenium pinnatifidum
Asplenium ruta-muraria
Asplenium Trichomanes

Camptosorus rhizophyllus Cheilanthes vestita Cystopteris fragilis Pellæa atropurpurea Polypodium vulgare Woodsia Ilvensis Woodsia obtusa

SPECIES OF MOIST ROCKS.

Asplenium Trichomanes Asplenium ebenoides Asplenium pinnatifidum Cystopteris bulbifera Cystopteris fragilis Pellæa gracilis Phegopteris polypodivides Woodsia obtusa

COLLECTING AND PRESERVING.



HEN making specimens for the herbarium the ferns should always be collected just as the fronds are ap proaching maturity, for the reason that the indusium, which plays an important part in the identification of the species,

is likely to wither and lose some of its characteristics when too old. A glance at the underside of the fronds will quickly show whether they are at a proper stage for collection. If one does not happen upon the plants until late in the season, they may still be collected, for an old fertile frond is much better than one too young, or none at all. It is always best to collect both fertile and sterile fronds of each species even when they do not appear to differ, and in all cases when there is a difference, it is, of course, very important that both forms be taken. If one is desirous of having a very complete herbarium, he will probably collect several specimens to show the young buds or crosiers, the rootstock and any variations from the normal in rootstock, frond, or fruit that he may find. The most valuable herbarium will also contain specimens of the same species from widely separated localities. Only in this way can one note the

differences in form which varying soils and altitudes produce.

In collecting ferns for study in the fresh state, the tin collecting-box or vasculum, about eighteen inches long and half as wide, oval in cross section with a door in the side is to be preferred. It may be obtained from any dealer in naturalist's supplies, or the nearest tinsmith can make one that will answer every purpose. In such a receptacle fronds will remain fresh for weeks if kept moist and cool. If one chances to find good specimens when the collecting case has been left behind, they may be carried home in fair condition by carefully piling the fronds upon one another and then wrapping the pile in several thicknesses of old newspaper. The parcel should be kept flat, not rolled.

For making herbarium specimens, the collecting press is generally considered superior to the vasculum. This is also for sale by dealers, but a most serviceable one can be made at home by securing two pieces of heavy "binder's board," each twelve by seventeen inches in size, and two stout straps, long enough to go around the shortest way and hold them together. Between these binder's boards should be placed a number of sheets of the cheapest white paper (old newspapers will do) cut eleven by sixteen inches in size.

When desirable specimens are found, the press is unstrapped, a sheet of paper taken out and the first specimen placed upon it; then comes another sheet of paper on top of the first, another specimen, and so on until all the specimens are cared for. The press is then closed, strapped tight, to hold the specimens in place, and carried on until more plants are found.

Small ferns may be pulled up entire, the earth shaken

from the roots and rootstock, and all placed in the press. Of larger ferns, single fronds may be collected, care being taken that representative specimens are secured. If the fronds are too long for the press, they may be bent once near the middle in the shape of a letter V. If still too large, they may be bent once more in the shape of the letter N. Fronds too long for this may be sectioned and the tip, middle pinnæ and lowest pinnæ with the stipe retained. In very large fronds a single pinnæ and a part of the mid-rib or rachis is often sufficient though other parts are always desirable, especially if they are peculiar in shape or manner of growth.

No specimen should be collected without carefully noting upon the sheet with it, certain things, the most important of which is the locality in which it was collected. If the name of a fern is lost, the plant can easily be identified again, but once the data regarding the locality is lost, it is gone forever. Specimens without locality are absolutely worthless. Next in importance is the character of the habitat (soil, moisture, shade, altitude, etc.) and the date when the specimen was collected. The collector's name is also desirable, and last of all the name of the species.

When one is collecting several sheets of the same species, it is customary to give each species a number, beginning at one and numbering consecutively. This number is merely marked on the sheets; while in a notebook, kept for the purpose, all the data regarding the species is set down under the same number. In this way, one avoids writing the data on each sheet and his labels can later be made up from the note-book. All the sheets of one species should be given the same number, but if another collection of the same species should

be made later, it should have a new number. The number of the species should also be noted on the label, and collections of one season should never duplicate the numbers of an earlier one.

In drying ferns for the herbarium, the main object is to obtain flat and unwrinkled specimens of the original green colour. To secure this, one should place his specimens in the drying press as soon as he reaches home. The drying press is much like the collecting press, except that instead of the sheets of white paper, there are sheets of thicker bibulous material, such as blotting paper, to quickly absorb the moisture from the plants. Pads of old newspaper may be used for these "driers," as they are called, but the dealers have an article called felt paper which is very much better and is not expensive. When putting the plants in the drying press, a drier is laid upon some flat surface, as a table or chair, a sheet of the collecting paper with its specimen is laid upon it, then another drier and another specimen, just as in the collecting press. The specimens should never be removed from the collecting sheet until perfectly dry. Many collectors cover each specimen with another collecting sheet while drying, to prevent the specimens from adhering to the driers. When all the plants to be dried are arranged in a compact pile, heavy weights are placed on top, in order that the plants may not shrivel in drying. For weights, one may use books, stones, bags of sand, etc., or if preferred, two strong trunk straps may be passed around the pile and drawn tight. The straps are not so good as weights, because they do not close up on the pile as the plants shrink in drying, but they are often very useful when one is travelling from place to place, or when, for any reason, weights are not

readily obtainable. Plants that are fleshy and full of moisture should have a change of driers at the end of the first day, the wet driers being taken out and dry ones substituted, but leaving the collecting sheet unchanged; in fact all specimens are better for two or three changes of driers during the first few days. In ordinary weather the specimens will be dry enough to lay away in from six to ten days.

When one finds a rare species it is well to take more than one specimen, for these can readily be exchanged with collectors in other regions for ferns not in one's own collection. The beginner should be cautioned, however, against rooting out all of a rare species. In such cases, the rule should be to collect sparingly. Botanists have a great contempt for the vandal who heedlessly destroys a station for a rare plant.

In making up packages for exchange, one should proceed as if putting plants in the collecting press, piling the sheets and specimens upon one another with a stout piece of pasteboard at the top and bottom of the pile. When the bundle is wrapped and tied securely, it is ready for the mails. It should always be sent flat (never rolled) and unsealed. With each specimen should go a neatly written or printed label containing all necessary data. These labels may be included in the parcel with the specimens without rendering it subject to letter rates of postage. At present the correct rate of postage for such parcels is one cent an ounce in the United States and Canada, and about twelve cents a pound to such foreign countries as have a parcel post. Specimens sent in exchange are usually unmounted. In making exchanges, it is well to be generous and to give rather more than is received. When a correspondent has other

rare species for exchange depend upon it, he will write to the generous exchangers first.

Specimens are now usually mounted by being glued to the herbarium sheet, though there are still many botanists who prefer to fasten them in place by strips of gummed paper or linen. If plants are to be glued to the sheet, the prepared liquid glue will be found most satisfactory. It should be spread very thinly upon a sheet of glass or cardboard and the specimens laid in it for an instant. The parts of the specimen which will touch the mounting sheet will naturally take up the most glue and so fasten the specimen securely. Care should be taken not to get too much glue upon the specimens. A very small amount will suffice. A sponge or wet cloth should be kept at hand for removing from the upper surfaces of the specimens any glue that may get upon them. The beginner will do well to practice with specimens of little value until accustomed to the work. As each specimen is mounted it is covered with a sheet of white paper and placed between driers under a weight for a day, to allow the glue to dry. Afterward it is usual to further strengthen any heavy parts, like stipes or rootstocks, by fastening them with gummed linen.

The herbarium sheet should always be 11½ by 16½ inches in size. This is the one law in herbarium making that must not be disregarded. The quality of paper is optional, but it is best in the long run to get a good grade of linen "ledger" paper, weighing not less than twenty pounds to the ream of five hundred sheets, herbarium size. Fertile fronds should always be mounted with the fruit showing. Sterile fronds may show the upper surface. It is not a good plan to mount specimens of one species from several different localities upon

the same sheet, even when the plants are small, although it is permissible to mount several specimens of the same species from the same locality together; in fact it is desirable that the sheet be pretty well covered with specimens. Room should always be left in the lower right-hand corner of the sheet for the original label, which should be firmly pasted to the sheet.

Collectors who wish to remove living ferns from field and wood to their gardens, can best do this in autumn when the ferns are resting or early in spring before the fronds have unfurled; but so long as the roots are kept from drying, they may be moved at other seasons without much difficulty. If ordinary care is taken they will scarcely wilt. The roots can be kept moist by wrapping them with damp cloths or sphagnum moss. There are none of our ferns that will not grow in cultivation provided they are given conditions similar to those in their native haunts.

One of the most valuable as well as fascinating aids to a knowledge of the ferns' life histories is to be found in the fern garden. This affords many opportunities for observation and study at times when the woods and fields cannot be visited. Shade is a prime requisite in the fern garden and next to it comes good soil. For the latter, leaf mould from the woods mixed with sandy garden soil will answer very well. While ferns delight in moisture, they do not like it standing about their roots. The drainage, therefore, should be good. For the rock species, a loose wall, preferably of limestone, with numerous chinks filled with earth, is desirable. The stones should be so placed that water falling upon them will run in toward the roots; otherwise they will soon dry out. If the ferns are to be planted against a

fence or wall, the largest species should be planted in the rear. There is a wide field for exercising one's own taste in the matter of planting the fern garden, and these general rules may be modified or improved upon as one's inclination directs.

IDENTIFICATION AND NOMEN-CLATURE.



HE collector who is making a special effort to identify the ferns, will, in the course of two or three weeks, become proficient enough to refer any new specimen he may find to its proper genus by a glance at the fruit. However much other things may vary, the way in which each genus bears its fruit never changes. The *Aspidiums*, big and little, have round fruit-dots covered by a nearly

heart-shaped or kidney-shaped indusium which is fastened to the frond by the sinus. The *Aspleniums* have short, narrow, indusiate sori with the indusium fastened by the side; while in *Polypodium* and *Phegopteris* the sori are round without trace of an indusium. In *Pteris* the indusium is marginal and the fruit in a continuous line around the pinnules, and in *Pellæa* the principal difference is that this line is not continuous. All the *Polystichums*

have circular indusia fixed by the depressed centres, and the *Adiantums* fruit in crescent-shaped sori under a reflexed tooth of the pinnules. *Cystopteris* has hoodshaped indusia arching over the round sori, and the *Woodsias* have star-shaped indusia spread out beneath the sori. In *Dicksonia* the spore-cases seem to be in little green cups held by overlapping teeth of the pinnules, and in *Woodwardia* the large and conspicuous sori are oblong, like links in a chain.

Should any species prove puzzling, the beginner can easily trace it by referring to the illustrated key to the genera following. To show its workings let us suppose that he has found a specimen with round sori covered with a reniform indusium, which he wishes to identify. Turning to the Key he observes that it is divided into sections and the sections again divided, each division more closely limiting the species included under it. The first sections are numbered I and II. In one of these his specimen will be found. Section I contains only species with "sporangia in spikes, panicles, or berrylike structures," therefore his plant must be in section II, where the ferns have "sporangia on the underside of the frond." In this section are two lesser divisions each marked with two stars (* *). The first contains only species without indusium and is passed by for the section with indusium present. In this are several paragraphs marked 4, and after comparing them he decides that his plant belongs to the one that does not have its "indusium formed by the margin of the frond." From the groups under this division, marked d, the one with roundish sori is selected; and the division under this, with reniform indusia, shows this plant to be an Aspidium. The page numbers in the Key refer to the pages of

"Our Ferns in their Haunts," where the species are fully described.

In exact writing it is usual to place after the name of the species, the name, or the abbreviation of the name of the person who first described it, in order that we may know which species is meant. Thus Pteris aquilina L. indicates that Linnæus described this particular species of Pteris. In other days, however, fewer genera of ferns were recognised, and species which we now consider to belong to very different families were once placed together. When these were finally transferred to their rightful genera, the practice arose of writing after the species the name of the describer in parenthesis, followed by the name of the person who placed it in the new genus. Camptosorus rhizophyllus (L.) Link is understood to mean that Linnæus described the species, but that Link first put it in its rightful genus. This way of citing the authorities has had considerable vogue, but there is a growing sentiment in favour of considering a species as not properly named so long as it is not in its proper genus, and to place after it the name of the person who first made the correct combination of generic and specific names. This method has been followed in the check-list of ferns in this book, as well as in the synonomy that accompanies each name.

KEY TO THE GENERA.

The most prominent characteristics are italicised.

SECTION I.

(Sporangia in spikes, panicles or berry-like structures.)

FRUITING FRONDS WHOLLY FERTILE.

PAGE.



1. Fruit in a one-sided spike; plants very small; sterile frond thread like. Curly grass.

SCHIZÆA. 277

1. Fruit in a club-shaped, thrice pinnate, woolly, brown spike; fronds bipinnatifid; fruit in early spring. Flowering fern.

> OSMUNDA. 25



1. Fruit in berry-like green structures, in a twice pinnate spike; fronds broad and coarse; rootstock creeping. Fruit in late summer. Sensitive fern.

ONOCLEA. 253



1. Fruit in nearly cylindrical slightly notched pinnæ; fertile frond pinnate; sterile tall, bipinnatifid; rootstock erect, fruit late. Ostrich STRUTHIOPTERIS.

257

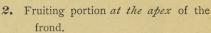




2. Fruiting portion in the middle of the frond. Interrupted fern.

OSMUNDA.

30



a. Sterile pinnæ palmate; rachis twining. Climbing fern.

LYGODIUM. 280

a. Sterile pinnæ pinnate; fronds large; fertile portion green, soon turning brown. Royal fern.

OSMUNDA. 32



2. Fruiting portion apparently on a separate stalk, above the sterile. b. Sterile portion entire, thick; fer-

tile, a simple spike. Adder's tongue.

> OPHIOGLOSSUM. 45

b. Sterile portion more or less divided; fruit in racemes or panicles occasionally in spikes. Moonwort: Grape ferns.

BOTRYCHIUM.







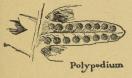


SECTION II.

(Sporangia on the under side of the fronds.)

** INDUSIUM WANTING.

PAGE.



3. Fruit-dots roundish, *large*; evergreen, rock species. Polypody.

POLYPODIUM. 196



3. Fruit-dots roundish, *small*; fronds *triangular*. Beech ferns.

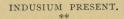
PHEGOPTERIS. 200



Notholeena

3. Fruit in lines on the margins of the pinnules; under surface of the fronds covered with whitish powder. . . NOTHOLÆNA.

288





Trichomanes

4. Sori on the edge of the pinnule; sporangia sessile at the base of a long bristle-like receptacle and surrounded by a funnel form, slightly two-lipped involucre. Filmy fern.

TRICHOMANES.

I RICHOMANES.

289

KEY TO THE GENERA.

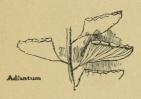


4. Sori near the margins. Indusia formed by the reflexed edges of the pinnules.

c. Sporangia in a continuous line; fronds large, ternate; indusium narrow. Bracken, PTERIS.

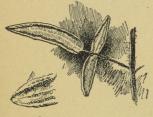
69

PAGE.



c. Sporangia in oblong or lunate sori, under a reflexed tooth of the pinnule; indusium broad; stipe and rachis dark and shining. Maidenhair. . ADIANTUM.

242



c. Sporangia in roundish masses.† Indusium broad, nearly continu-

ous; fronds smooth; stipes usually dark; rock species. Cliff brakes.

PELLÆA.

38

Pellea



Cheilanthe

† Indusium narrower, seldom continuous, often inconspicuous; fronds usually hairy.

CHEILANTHES. 237



† Indusium of the reflexed edges, at first reaching nearly to the midrib, later nearly flat; fruiting pinnules, long, podlike; sterile fronds broad; stipes pale. Rock brakes.

CRYPTOGRAMMA.

287

PAGE.



Woodwardia



Polystichum



Cystopteris



4. Sori various; indusium never formed of the margin of the frond.

d. Sori and indusium oblong, parallel with the midrib, somewhat sunken in the tissues of the frond; indusium opening toward the middle of the pinnules; water-loving species. Chain ferns.

WOODWARDIA. 216

d. Sori and indusium roundish.

†† Indusium *peltate*, fixed by the *centre*; evergreen species in rocky woods. Shield ferns.

POLYSTICHUM. 106

† † Indusium reniform or cordate, fixed by the sinus; large, mostly woodland species. Wood ferns.

ASPIDIUM. 117

†† Indusium hood-shaped, attached to the frond by its broad base, below the sorus and arching over it, soon withering; moisture loving species. Bladder ferns.

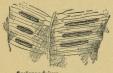
CYSTOPTERIS. 209

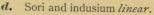
†† Indusium star-shaped, of a few irregular broad or narrow segments fixed beneath the sorus and enclosing it when young. Not easily seen in most species. Rockloving plants usually somewhat chaffy.



++ Indusium cup-shaped, fixed beneath the sorus; sori minute on a tooth of the ultimate pinnules; fronds very finely cut. Boulder fern. . DICKSONIA.

229





† † † Several times longer than wide, double; indusia opening toward each other; blade thick linear, entire. Hart's-tongue.

SCOLOPENDRIUM, 268



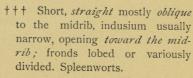
Camptosorus

††† Shorter, some parallel to the midrib, others oblique to it, often in pairs or joined at the ends, irregularly scattered on the underside of the frond; blade tapering to a slender tip. Walking fern.

> CAMPTOSORUS. 265



Asplenium



ASPLENIUM. 155



††† Short; indusium more or less curved on the side attached to the frond, and when young usually extending across a vein; robust species. Lady fern. ATHYRIUM.

KEY TO THE GRAPE FERNS.

Plant large, fruiting in spring, sterile portion much divided B. Virginianum. Plant smaller. Fruiting in autumn, sterile portion long stalked, triangular B. obliquum. Fruiting in summer.
Fruiting in autumn, sterile portion long stalked, triangular B. obliquum. 54
Fruiting in autumn, sterile portion long stalked, triangular B. obliquum. 54
Fruiting in summer
Plant very fleshy, sterile portion with mostly lunate seg-
ments
Plant less fleshy
Sterile portion short stalked, above the middle of the
stem B. matricariæfolium. 60
Sterile portion stalked usually below the middle of the
stem
Sterile portion sessile near the top of the stem .
B. lanceolatum. 59
KEY TO THE WOOD FERNS.
(Aspidium.)
Fronds pinnate, the pinnæ pinnatifid.
Blade thin, deciduous.
Lower pinnæ reduced to mere lobes
A. Noveboracense. 120
Lower pinnæ not or little reduced.
Veins simple . A. simulatum. 123
Veins forked . A. Thelypteris. 117
Blade rather thick, evergreen.
Fronds small, narrow, rock species A. fragrans. 147
Fronds large, two or more feet high.
Lower pinnæ, nearly triangular A. cristatum. 139
Lower pinnæ longer.
Sori close to the margin, A. marginale. 135
Sori nearer the midvein.
Frond custs A. filix-mas, 136
Frond ovate . A. Goldieanum. 137 Fronds twice pinnate with lower pinnules pinnatifid. A. Boottii. 141
Fronds nearly thrice pinnate

KEY TO THE SPLEENWORTS.

(Asplenium.)	
Fronds pinnatifid or pinnate below, apex long tapering.	PAGE
Blade thick, lobes rounded A. pinnatifidum.	16;
Blade thin, lobes pointed . A. ebenoides.	160
Fronds pinnate.	105
Rachis green or straw-coloured.	
Less than six inches high A. viride.	158
Taller, pinnæ long pointed . A. angustifolium.	188
Rachis dark.	
Pinnules not eared at base . A. Trichomanes.	155
Pinnules eared at base.	
Mostly opposite . A. parvulum.	159
Mostly alternate . A. ebeneum.	160
Fronds more than once pinnate.	
Stipes green, blades inclining to triangular	
pinnules fan-shaped. A. ruta-muraria.	162
Stipes darker below, blade longer and	
narrower A. montanum.	164
Stipes and rachis dark. A. Bradieyi.	166
(See, also, Athyrium.)	
KEY TO CHEILANTHES.	
KET TO CHEILANTHES.	
Fronds nearly smooth C. Alabamensis.	242
Fronds hairy, twice pinnate	237
Fronds tomentose, thrice pinnate.	
Very small species, stipe nearly smooth. C. lanuginosa,	240
Larger, stipes tomentose . C. tomentosa,	239
KEY TO WOODSIA.	
Stipe not jointed W. obtusa.	96
Stipe obscurely jointed near the base.	90
Frond more or less chaffy . W. Ilvensis,	93
Fronds smooth or smoothish.)3
Pinnæ ovate, deeply pinnatifid . W. glabella.	99
Pinnæ rounded ovate, 5-7 lobed, W. hyperborea.	08

CHECKLIST OF THE FERNS OF NORTHEASTERN AMERICA.

(NORTH OF THE GULF STATES AND EAST OF THE ROCKY MOUNTAINS.)

CHECKLIST OF THE FERNS OF NORTHEASTERN AMERICA.

(NORTH OF THE GULF STATES AND EAST OF THE ROCKY MOUNTAINS.)

ADIANTUM L.

- I. Adiantum Capillus-Veneris L.
- 2. Adiantum pedatum L.

ASPIDIUM Sw.

- 3. **Aspidium Boottii** Tuckerm. Dryopteris Boottii Underw.
- 4. Aspidium cristatum Sw.

 Dryopteris cristata A. Gray.
- 5. Aspidium cristatum Clintonianum D. C. Eaton.

 Dryopteris cristata Clintoniana Underw.
- 6. Aspidium cristatum x Marginale Dav.
- 7. Aspidium filix-mas Sw.

 Dryopteris filix-mas Schott.
- 8. Aspidium fragrans Sw.

 Dryopteris fragrans Schott.
- Aspidium Goldieanum Hook.
 Dryopteris Goldieana A. Gray.

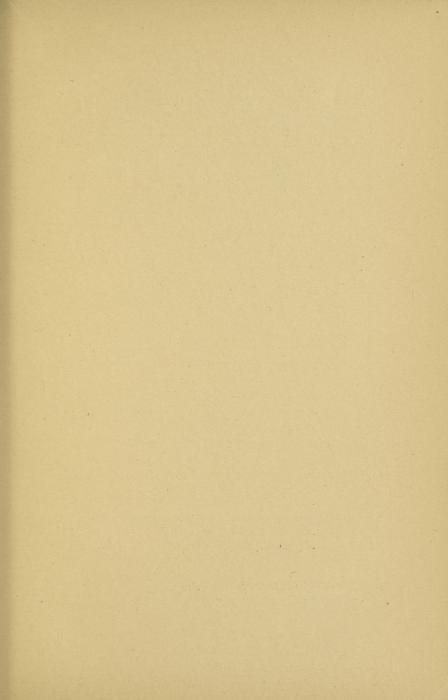
 Aspidium Goldieanum f. celsum Palmer.
- Aspidium marginale Sw.
 Dryopteris marginalis A. Gray.
- II. Aspidium Noveboracense Sw.

 Dryopteris Noveboracensis A. Gray.

Aspidium Noveboracense f. fragrans Peck.

12. Aspidium simulatum Dav.

Dryopteris simulata Dav.



- 13. Aspidium spinulosum Sw.

 Dryopteris spinulosa Kuntze.
- 14. Aspidium spinulosum intermedium D. C. Eaton.

 Dryopteris spinulosa intermedia Underw.
- 15. Aspidium spinulosum dilatatum Hornemann.

 Dryopteris spinulosa dilatata Underw.
- 16. Aspidium Thelypteris Sw.

 Dryopteris Thelypteris A. Gray.

ASPLENIUM L.

- 17. Asplenium angustifolium Michx.
- 18. Asplenium Bradleyi D. C. Eaton.
- 19. Asplenium ebeneum Ait.

 Asplenium platyneuron Oakes.

 Asplenium ebeneum f. serratum A. Gray.
- 20. Asplenium ebenoides Scott.
- 21. Asplenium montanum Willd.
- 22. Asplenium parvulum Mart. & Gal.
- 23. Asplenium pinnatifidum Nutt,
- 24. Asplenium ruta-muraria L.
- 25. Asplenium Trichomanes L.
 Asplenium Trichomanes f. incisum Moore.
- 26. Asplenium viride Huds.

ATHYRIUM Roth.

- 27. Athyrium thelypteroides Desv.

 Asplenium acrostichoides Sw.

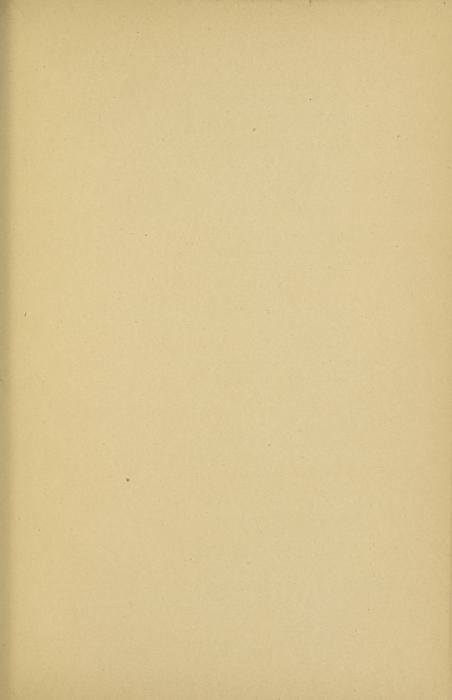
 Asplenium thelypteroides Michx.
- 28. Athyrium filix-fæmina Roth.

 Asplenium filix-fæmina Bernh.

 Asplenium filix-fæmina Michauxii Mett.

BOTRYCHIUM Sw.

- 29. Botrychium lanceolatum Angs.
- 30. Botrychium Lunaria Sw.



- 31. Botrychium matricariæfolium A. Br.
 Botrychium neglectum Wood.
- 32. Botrychium matricariæfolium tenebrosum.

 Botrychium tenebrosum A. A. Eaton.
- 33. Botrychium obliquum Muhl.

 Botrychium ternatum obliquum Milde.

 Botrychium obliquum f. intermedium D. C. Eaton.
- 34. Botrychium obliquum dissectum.

 Botrychium ternatum dissectum Milde.

 Botrychium dissectum Sprengel.
- 35. Botrychium simplex Hitchcock.
- Botrychium Virginianum Sw.
 Botrychium Virginianum f. gracile Pursh.

CAMPTOSORUS Link.

37. Camptosorus rhizophyllus Link.
Camptosorus rhizophyllus f. intermedius Arthur.

CHEILANTHES Sw.

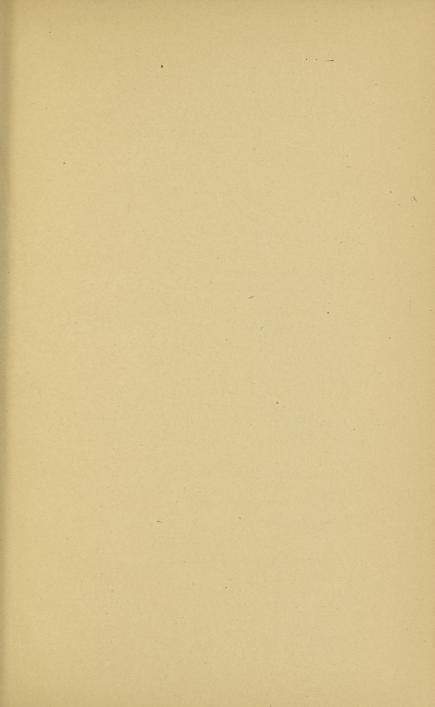
- 38. Cheilanthes Alabamensis Kunze.
- 39. Cheilanthes lanuginosa Nutt.
 Cheilanthes Feei Moore.
 Cheilanthes gracilis Mett.
- 40. Cheilanthes vestita Sw.
 Cheilanthes lanosa Watt.
- 41. Cheilanthes tomentosa Link.

CRYPTOGRAMMA R. Br.

42. Cryptogramma acrostichoides R. Br.

CYSTOPTERIS Bernh.

- 43. Cystopteris bulbifera Bernh.
 Filix bulbifera Underw.
- 44. Cystopteris fragilis Bernh.
 Filix fragilis Underw.
 Cystopteris fragilis f. dentata Hook.



45. Cystopteris montana Bernh. Filix montana Underw.

DICKSONIA L'Her.

46. **Dicksonia pilosiuscula** Willd.

Dicksonia punctilobula A. Gray.

Dennstædtia punctilobula Moore.

Dicksonia pilosiuscula f. cristata Dav.

LYGODIUM Sw.

47. Lygodium palmatum Sw.

NOTHOLÆNA R. Br.

48. Notholæna dealbata Kunze.

Notholæna nivea dealbata Dav.

ONOCLEA L.

49. Onoclea sensibilis L.
Onoclea sensibilis f. obtusilobata Torr.

OPHIOGLOSSUM L.

50. Ophioglossum vulgatum L.
Ophioglossum vulgatum f. arenarium.
Ophioglossum arenarium E. G. Britton.
Ophioglossum vulgatum f. Engelmanni.
Ophioglossum Engelmanni Prantl.

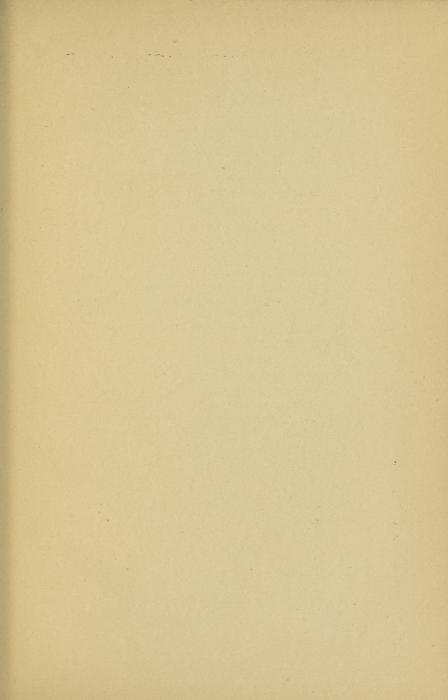
OSMUNDA L.

- Osmunda cinnamomea L.
 Osmunda cinnamomea f. frondosa A. Gray.
- 52. Osmunda Claytoniana L.
- 53. Osmunda regalis L.

PELLÆA Link.

- 54. Pellæa atropurpurea Link.
- 55. Pellæa densa Hook.
- 56. Pellæa gracilis Hook.

Pellæa Stelleri Watt. Cryptogramma Stelleri Prantl.



PHEGOPTERIS Fee.

- 57. Phegopteris Dryopteris Fee.
 Phegopteris Dryopteris Robertiana Dav.
 Phegopteris Calcarea Fee.
- 58. Phegopteris hexagonoptera Fee.
- 59. *Phegopteris polypodioides* Fee. *Phegopteris Phegopteris* Underw.

POLYPODIUM L.

- 60. **Polypodium incanum** Sw.

 Polypodium polypodioides Hitchcock.
- 61. Polypodium vulgare L.
 Polypodium vulgare f. Cambricum Willd.
 Polypodium vulgare f. biserratum Millspaugh.
 Polypodium vulgare oreophilum Maxon.
 Polypodium vulgare deceptum Maxon.

POLYSTICHUM Roth.

- 62. Polystichum acrostichoides Schott.

 Aspidium acrostichoides Sw.

 Dryopteris acrostichoides Kuntze.

 Polystichum acrostichoides f. incisum Underw.

 Polystichum acrostichoides f. crispum Clute.
- 63. **Polystichum Braunii** Lawson.

 Aspidium aculeatum Braunii Doëll.

 Dryopteris Braunii Underw.
- 64. **Polystichum lonchitis** Roth.

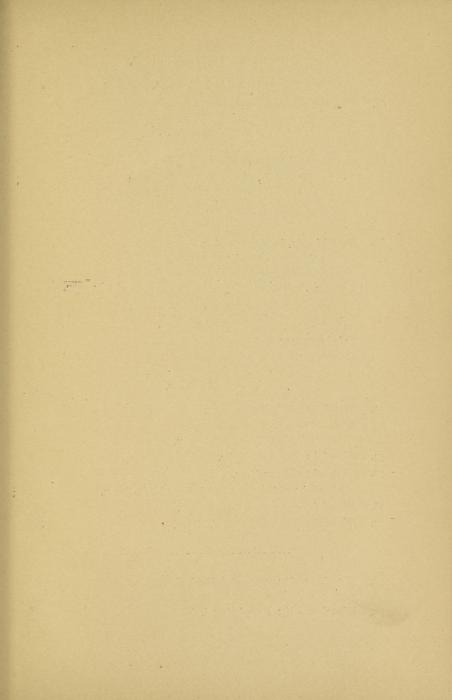
 Aspidium lonchitis Sw.

 Dryopteris lonchitis Kuntze.

PTERIS L.

- 65. Pteris aquilina L.
 Pteridium aquilinum Kuhn.
- 66. Pteris aquilina pseudocaudata Clute.

 Pteris aquilina caudata Hook.



SCHIZÆA J. E. Smith.

67. Schizæa pusilla Pursh.

SCOLOPENDRIUM Adans.

68. Scolopendrium vulgare J. E. Smith.

Scolopendrium Scolopendrium Karst.

Phyllitis Scolopendrium Newman.

STRUTHIOPTERIS Willd.

69. Struthiopteris Germanica Willd.
Onoclea Struthiopteris Hoffm.
Matteuccia Struthiopteris Todaro.
Struthiopteris Germanica Pennsylvanica Lawson.

TRICHOMANES L.

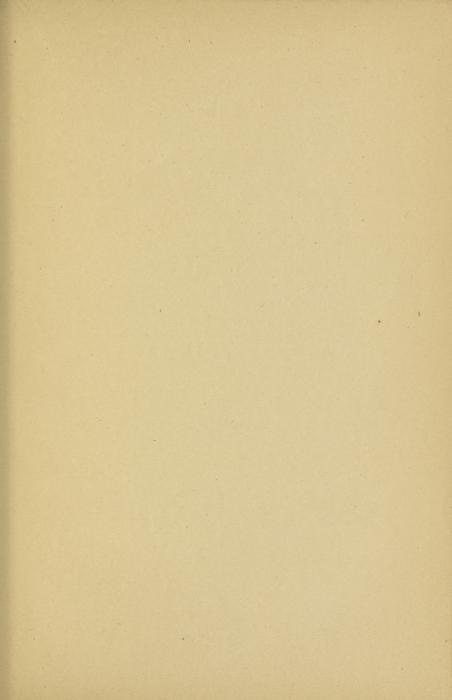
- 70. Trichomanes Petersii A. Gray.
- 71. Trichomanes radicans Sw.

WOODSIA R. Br.

- 72. Woodsia glabella R. Br.
- 73. Woodsia hyperborea R. Br. Woodsia alpina S. F. Gray.
- 74. Woodsia Ilvensis R. Br.
- 75. Woodsia obtusa Torr.
 Woodsia obtusa f. glandulosa D. C. Eaton.
- 76. Woodsia Oregana D. C. Eaton.
- 77. Woodsia scopulina D. C. Eaton.

WOODWARDIA J. E. Smith.

- 78. Woodwardia angustifolia J. E. Smith. Woodwardia areolata Moore.
- 79. Woodwardia Virginica J. E. Smith.



LIST OF ABBREVIATIONS USED IN THE CHECKLIST OF FERNS.

A. Br. A. Braun.

Adans. M. Adanson.

Ait. W. Aiton.

Angs. J. Angstroem. Bernh. J. J. Bernhardi.

R. Br. Robert Brown.

Dav. Geo. E. Davenport.

Desv. N. A. Desvaux.

Hoffm, G. F. Hoffman.

Hook. W. J. Hooker.

Huds. W. Hudson.

Karst. Karsten.

L'Her, C. L. L'Heritier.

L. Linnæus.

Mart. & Gal. Martens & Galeotti.

Mett. G. Mettenius.

Michx. A. Michaux.

Muhl. G. H. E. Muhlenberg.

Nutt. T. Nuttall.

Sm. J. E. Smith.

Sw. O. Swartz,

Torr. J. Torrey.

Underw. L. M. Underwood. Tuckerm. E. Tuckerman.

Willd. K. S. Willdenow.

GLOSSARY.

ACULEATE.—Armed with prickles.

ACUMINATE.—Tapering to a slender point.

ACUTE.—Pointed; ending in a sharp point.

ADVENTITIOUS.—That which comes from abroad; as a plant introduced by chance.

ADVENTITIOUS BUDS.—Buds produced without order on any part of the plant.

ANASTOMOSING.—Forming a network; as veins uniting with one another.

Annulus.—A ring, especially that which surrounds the spore-cases in most ferns.

ANTHERIDIA.—The male organs on the prothallium.

APICULATE. —Terminating abruptly with a small point.

ARCHEGONIA.—The female organs on the prothallium.

AREOLA (PL. AREOLÆ).—A space enclosed by anastomosing veinlets. AREOLATE.—Having areolæ,

ARTICULATED. - Jointed or having the appearance of a joint.

AURICLED.—Eared.

AURICULATE.—With ear-like appendages.

BIPINNATE.—Twice pinnate.

BIPINNATIFID.—Twice pinnatifid.

BLADE.—The expanded, leafy portion of a frond.

BRISTLE.—A stiff hair; any slender outgrowth from the plant as in the fruiting parts of filmy ferns.

BULBIFEROUS.—Bearing little bulblets.

BULBLET.—A small bulb, especially such as are borne upon leaves or in their axils.

CAUDATE.—With a slender, tail-like appendage.

CAUDEX. - A trunk, especially that of a tree-fern.

CHAFF.—Slender, papery scales.

CHARTACEOUS.—Having the texture of parchment.

CHLOROPHYLL.—The green colouring matter of plants.

CILIATE. - Fringed with fine hairs.

CIRCINATE.—Coiled, as the buds of ferns, from tip to base.

CLAVATE.—Club shaped.

COMPOUND .- Divided into two or more portions, said of the frond.

CONFLUENT.—Blended together.

CORDATE.—Heartshaped; ovate with a sinus at base.

CORIACEOUS.—Like leather in texture.

CRENATE.—With rounded teeth; said of margins.

CRENULATE.—Scalloped with small rounded teeth.

CROSIER.—An uncoiling frond.

CROWN.—The growing end of the rootstock or caudex.

CUNEATE.—Wedge shaped.

CUSPIDATE.—Terminating in a sharp, hard point.

DECIDUOUS.—Not evergreen; subject to being shed at certain seasons.

DECOMPOUND.—Several times compounded or divided.

DECUMBENT.—Not erect; bending along the ground.

DECURRENT.—Extended downward along the rachis; said of the bases of pinnæ, etc.

DEFLEXED.—Bent abruptly downward.

DENTATE. -- Toothed; said of the margins.

DENTICULATE.—Finely toothed.

DEPAUPERATE.—Starved; prevented from coming to its natural size through lack of nourishment.

DICHOTOMOUS. - Forked in pairs; two forked.

DIMIDIATE.—Halved, or as if one half was wanting, as in the pinnules of some Adiantums.

DIMORPHOUS.—Of two forms; said of ferns whose fertile and sterile fronds are not alike.

DISSECTED.—Cut into many lobes or divisions.

ELLIPTICAL.—Oblong with rounded ends.

EMARGINATE.—Notched at the summit.

ENTIRE.—Not divided; said of fronds or pinnules whose margins are without notches or teeth.

FALCATE.—Scythe shaped; curved upward.

FERTILE.—Producing spores.

FLABELLATE.—Fan-shaped.

FILIFORM.—Threadlike.

FOVEOLATE.—Honeycombed.

FROND.—A fern leaf. Properly the word frond includes both *stipe* and *blade*, but frequently it is used simply to designate the leafy portion.

FRUIT.—Sporangia.

FRUIT-DOT.—A sorus.

FUGACIOUS.—Short-lived; falling early.

GLABROUS.—Smooth.

GLAND.—A minute globular or pear-shaped organ which usually secretes a resinous, waxy, gummy or aromatic product.

GLANDULAR.—Furnished with glands.

GLAUCOUS.—Covered with a very fine, powdery substance, as plums are.

GLUTINOUS.—Covered with a sticky exudation.

HABIT.—The general appearance of a plant.

HABITAT.—The natural dwelling place of an animal or plant.

HIRSUTE.—Having coarse stiff hairs.

IMBRICATED.—Overlapping or breaking joints like shingles on a roof.

INCISED.—Cut into deep sharp teeth.

INDUSIUM (PL. INDUSIA).—The thin, scale-like covering of immature sori.

INVOLUCRE.—The cup-shaped processes surrounding the sporangia in the filmy ferns; an indusium.

LACINIATE.—Cut into deep, narrow, irregular lobes; slashed.

LANCEOLATE.—Rather narrow and tapering to the apex; occasionally tapering at base also.

LAMINA.—A blade; the leafy portion of a frond.

LINEAR.—Long and narrow.

LOBE.—One of the small divisions of a frond.

LUNATE.—Shaped like a half-moon.

MARGINAL.—Situated on, or close to the margin.

MEMBRANACEOUS.—Like a membrane; very thin and flexible.

MIDRIB.—The prolongation of the stipe through an undivided frond or pinna.

MIDVEIN.—The principal vein in a pinnule or segment.

MUCRONATE.—Having the midvein prolonged beyond the pinnule forming a point.

OBLANCEOLATE.—The reverse of lanceolate; broadest near the apex.

OBLONG.—Two or three times longer than broad.

OBOVATE.—The reverse of ovate.

OBTUSE.—Blunt; without point.

ORBICULAR.—Circular.

OVATE.—Egg-shaped; the broadest part near the base.

PALEACEOUS.—Clothed with chaff.

PALMATE.—With spreading divisions like the fingers of the hand.

PANICLE.—A cluster of fruit in which the stems branch more or less.

PAPYRACEOUS.—Paper-like.

PEDICEL.—A tiny stalk; especially the stalk of the sporangia.

PELTATE.—Shield-shaped; said of scales and indusia that are attached to the frond by their centers.

PERSISTENT.—Not falling away; remaining on the plant.

PETIOLE.—Same as stalk and stipe.

PINNA (PL. PINNÆ).—One of the primary divisions of a frond.

PINNATE.—Consisting of several leaflets arranged on each side of a common petiole or rachis.

PINNATIFID.—Divided in a pinnate manner, but with leaflets not entirely separate.

PINNULE.—One of the small divisions of a pinnate leaf.

PROCUMBENT.—Lying along the ground.

PROLIFEROUS. - Giving rise to new plants.

PROTHALLIUM (PL. PROTHALLIA).—The minute scale-like growth from the spore of a fern.

PUBESCENCE.—A covering of soft, short hairs.

PUBESCENT.—Covered with fine, soft hairs.

QUADRIPINNATE.—Four times pinnate.

RACHIS.—The continuation of the stipe through a compound frond.

RECEPTACLE.—The part of the frond to which the sporangia are attached, especially in the Filmy Ferns.

REFLEXED.—Abruptly bent downward or backward.

RENIFORM.—Kidney shaped.

REVOLUTE.—Rolled backward, as the margins of some fronds.

RHIZOME.—An underground stem; a rootstock.

ROOTSTOCK.—Same as rhizome. The portion that produces the fronds in most of our species.

SCALES.—The chaff on the stems of ferns.

SCANDENT.—Climbing.

SEGMENT.—One of the smaller divisions of a pinnatifid frond.

SERRATE.-With sawlike teeth; said of margins.

SESSILE.—Without a stalk.

SINUATE.—Wavy; said of margins.

SINUS.—The re-entering space between two lobes.

SORUS (PL. SORI).—An assemblage of sporangia; a fruit dot.

SPATULATE.—Spoon-shaped.

SPINE.—A sharp point; a thorn.

SPINULOSE.—Thorny; set with small spines.

SPORANGE (PL. SPORANGIA.)—A tiny globe in which the spores are produced.

Spore.—A one-celled body, the fruit of the higher cryptogams; it is produced asexually and is the analogue of a seed.

SPORECASE.—Same as sporange; the case in which the spores are borne.

STALK.—Same as stipe.

STERILE.—Barren. Said of fern leaves that do not produce spores.

STIPE.—The petiole or stalk of the fern leaf which bears the leafy portion aloft.

STOLON.—A trailing, or often underground, branch.

SUBULATE.—Awl-shaped.

TERNATE.—With three nearly equal divisions.

TOMENTOSE.—Covered with matted wood.

TOMENTUM.—Close matted woolly hairs.

TOOTH.—The smallest divisions of the fronds.

TORTUOUS.—Bent or twisted in different directions.

TRIPINNATE.—Three times pinnate.

TRUNCATE.—Appearing as if cut off abruptly.

UNDULATE.—Wavy-margined.

VASCULAR.—Containing vessels, ducts, etc. as the stems of ferns.

VEIN.—One of the small branches in the framework of a leaf.

VENATION.—The manner in which the veins are arranged in the leaf.

VERNATION.—The arrangement of leaves in the bud.

VIVIPAROUS.—Producing young upon various parts of the plant.

WINGED.—Bordered with tissue as the rachis of some ferns.

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